Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of Part 15 and other Parts of the	)	ET Docket 01-278
Commission's Rules.	)	RM-9375
	)	RM-10051
	)	

Comments of Comsearch

Comsearch, pursuant to Section 1.415 of the FCC rules, hereby respectfully submits the following comments in response to the Notice of Proposed Rulemaking ("NPRM") in the above captioned proceeding.

Comsearch is an independent engineering firm specializing in spectrum management of terrestrial microwave, satellite and mobile telecommunications systems. We have been performing interference and electromagnetic environmental measurements for telecommunications since the company was founded in 1977. Our experience at spectrum management in general and RF measurements in particular enables us to address the issue of radar detectors and earth station interference.

Comsearch field engineers are often called upon to troubleshoot earth station performance problems. In a number of cases, our measurements investigating possible external interference have determined radar detectors to be the source of harmful interference to Ku-Band earth stations. In response to the questions posed in the

NPRM[1], the following comments discuss this interference and propose limits for the unintentional emissions of the radar detector receivers.

Radar Detector Interference to Satellite Reception

Comsearch engineers have been involved with interference investigation measurements on numerous occasions. In a number of cases, our measurements have determined radar detectors to be the source of harmful interference to Ku-Band earth stations. These measurements have shown radar detectors to be the cause of interference degradation to both VSATs[2] and conventional Ku-Band earth stations. The interference was found to be damaging to both digital data and video where the interference would cause data errors, video drop out, or loss of data synchronization.

The source of this interference was found to be local oscillator leakage from radar detectors in vehicles near the Ku-Band earth stations. As receivers operating above 960 MHz, these radar detector devices are presently exempt from the Part 15 emission limits.[3] Removal of this exemption would result in receivers being subject to the present limit for unintentional radiators above 960 MHz: a field strength of 500 (μV/m) at a distance of 3 meters.[4] We have measured radar detector interference that exceeded the typical digital earth station interference criterion of –156 (dBW/MHz)[5] by 33 dB at a distance of 235 meters. By the analysis below, we conclude that the radar detector emissions were well

---

[1] NPRM at 14.
[2] Very Small Aperture Terminals. A class of earth stations characterized by the use of small antennas.
[3] See 47 C.F.R. §15.101(b).
[4] See 47 C.F.R §15.109(a).
[5] See 47 C.F.R. 25.251(b).

above 500 (μV/m) at a distance of 3 meters, and based on our experience we believe that radar detectors typically do not meet that limit. Therefore imposing the 500 (μV/m) at a distance of 3 meters limit on radar detectors would provide some reduction of the interference potential. However, when we compare this existing Part 15 emission limit to the earth station interference objective we find that an earth station could still experience significant interference from a radar detector meeting the limit if the radar detector was operated near the earth station antenna. As shown below, in order to meet this typical earth station interference objective, emissions from devices such as radar detectors may need to be limited to a field strength of 60 (μV/m) at a 3-meter separation in the Ku band (11.7 - 12.2 GHz).

Calculation of Emission Limit for a Radar Detector in the Ku-Band

A typical digital earth station interference objective in the Ku-Band is –156 (dBW/MHz) ($2.5*10^{-16}$ (W/MHz)). The interference objective may be converted to a field strength using the following set of equations:

$$P_d = P_I / A_e$$

$$A_e = \lambda^2 G_r / 4\pi$$

$$FS = \sqrt{377 P_d}$$

Where:

P_d = Power Density (W/m^2)
P_I = Earth station interference criteria, $2.5X10^{-16}$ (W/MHz)
A_e = Effective area of the ES antenna in the direction of the radar detector (m^2)
λ = Wavelength (m) (λ = 0.02564 m at 11.7 GHz)
G_r = Gain of ES antenna in the direction of radar detector. Assumed to be 0.5

FS = Field Strength (V/m)
377 = Impedance of Free Space (Ω)

Using the above parameters, A_e = 2.6*10^{-5} (m^2). For interference less than 1 MHz bandwidth (which is the case for a radar detector local oscillator), *Pd* = 9.6*10^{-12} (W), and the corresponding field strength objective is *FS* = 60 (μV/m). Thus in order to meet the earth station's interference criterion, a radar detector should not produce a field strength greater than 60 (μV/m) at the earth station antenna. Since radar detectors may be operated in close proximity to Ku-Band earth stations, the emission limit may need to be set as low as 60 (μV/m) at a distance of 3 meters.

Working in the other direction, an interference field strength of 500 (μV/m) at the earth station antenna corresponds to an interference power P_I = 1.72X10^{-12} W or -137.6 dBW. Thus if the present Part 15 Limit were applied to a radar detector operated as close as 3 meters to a Ku-Band earth station antenna, the interference criteria could be exceeded by 18.4 dB. With a field strength limit of 500 (μV/m) at a distance of 3 meters, 25 meters distance would be required between a radar detector and earth station antenna to meet the earth station's interference objective. Reducing the emission limit 18.4 dB below the present limit of 500 μV/meter we also arrive at the recommended limit of 60 μV/meter.

Conclusions

The general prohibition of Part 15 against causing harmful interference[6] has not been effective in preventing radar detector interference to earth stations. To avoid further interference problems we recommend that radar detectors should be subject to Part 15 emission limits. Further, to meet existing earth station interference objectives, the limits in bands used for reception by earth stations, particularly the Ku-Band, should be more stringent than the present Part 15 limit of 500 (μV/m) at a distance of 3 meters. To determine a reasonable limit, we propose that the field intensity of a radar detector should not interfere with an earth station at a distance of 3 meters (approximately 10 feet). To avoid harmful interference at this distance, the Part 15 emission limit should be reduced 18.4 dB from 500 (μV/m) to 60 (μV/m) at a distance of 3 meters.

Respectfully Submitted,

COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, Virginia 20147

Prepared by:_____
Lester E. Polisky
Director, Field Services

Date: February 12, 2002

[6] See 47 C.F.R. 15.5(b).